PROJECT PROFILE

New Belgium Brewery

290-kW Renewable CHP Application

Project Overview

New Belgium Brewery, located in Fort Collins, Colorado, is the third largest brewery in the Colorado and the fifth largest craft brewery in the nation. They produce 11 different beers including "Fat Tire Amber Ale." The brewery currently produces about 330,000 barrels of beer annually, or 13,000 cases and 1,310 kegs daily. The beer is distributed to 15 western states. The company prides itself on environmental innovation, energy efficiency, conservation, and recycling, striving to make each of these a key component throughout the brewery.

Quick Facts

SIMPLE PAYBACK: 3 years
TOTAL PROJECT COST: $5 million (including the whole process water treatment plant)
MONTHLY ENERGY BILL SAVINGS: $3,000
EQUIPMENT: 290-kW engine with heat recovery from Continental Energy Systems
FUEL: Biogas produced from the brewing process wastewater and autolyzed yeast.
FACILITY SIZE: 105,000 sq feet, 200 employees
FACILITY PEAK LOAD: 900 kW
FACILITY AVERAGE LOAD: 500 kW
CHP IN OPERATION SINCE: 2003

Reasons for CHP

The City of Fort Collins was charging the brewery a large "plant investment fee" for the construction of infrastructure to process all of the brewery's high-strength wastewater in the municipal water system. Instead, New Belgium took the money they would have had to pay the city and put it towards the purchase of a process water treatment plant, including anaerobic digestion. New Belgium uses the methane produced by the digester to generate renewable electricity and heat.

In addition, New Belgium saw renewable biogas-fueled CHP as a way to be more environmentally sustainable. ""We do subscribe to wind power, but any time we can diversify our energy supply, and even better, produce our own power, that's a more optimal situation," said Hillary Mizia at New Belgium.

While wastewater cost savings and renewable energy production were the primary drivers, energy cost savings were another. New Belgium and other similar businesses in Fort Collins pay not only an energy use charge ($0.0164 per kWh) and a fixed demand charge ($4.31 per kW) but also a coincident peak demand charge ($11.62 per kW). The coincident peak demand is the amount of power New Belgium is using at the time when Platte River Power Authority (Fort Collins Utilities' generation and transmission supplier) hits its system-wide peak. The energy cost savings of $3,000 per month are mainly from cutting the coincident peak demand.

New Belgium Brewery's facility in Fort Collins, Colorado

290-kW engine retrofitted to run on biogas, from Belgium-based Continental Energy Systems

CHP System Equipment & Configuration

The cogeneration system is a 290-kW engine with heat recovery from Belgium-based Continental Energy Systems, provided as part of the whole process water treatment plant from Von Nordenskjöld in Germany. The engine is only fueled by biogas from the brewery's process water treatment plant, but it can run on natural gas at the flip of a switch. A special oil is used to handle the impurities in the biogas, which otherwise can cause corrosion. To reduce the moisture in the biogas, New Belgium runs the gas through a cool, underground pipe which condenses a lot of the moisture out. The engine is able to handle the remaining moisture.

The recovered heat is fed back to the anaerobic digester to maintain the digester's desired temperature of 90°F. In the winter, the digester requires supplemental heat to maintain the optimal temperature. In the summer, the digester can't use all the waste heat from the cogen, and New Belgium is looking into other ways to use the excess heat.

CHP Operation

New Belgium Brewery's 80,000 gallons/day process water treatment plant with anaerobic and aerobic digestion

- The cogen runs 10-15 hours per day, depending on the amount of available methane and the time of day.
- The amount of available methane varies according to how much wastewater is going into the digester, which depends on the amount of beer production at the time. An advanced software and control system measures the amount of available methane under the airtight hood, and controls the cogen operation according to preset conditions. The cogen system is set to start up when the methane storage volume under the hood is near 100%, and "burn down" until the volume is at about 40%.
- To ensure that the methane supply lasts throughout the peak hours, the cogen is usually set to run between 200-250 kW.
- No power export.
- Ongoing maintenance is the same as for a regular natural gas engine. New Belgium staff performs all the ongoing maintenance, and they report it hasn't been difficult.
- Reliability has been decent, after the initial start-up issues were resolved.
- Whenever the system has a problem, a general alarm goes off in the brewery control room, the system automatically shuts off if necessary.
- An expansion of the process water treatment plant is planned. Holding ponds in front of the anaerobic digesters will allow the digesters to supply a more consistent level of biogas to the cogeneration, so it can run for longer periods – up to 24 hours a day. The expansion is expected to have a 7-8 year payback.

New Belgium Brewery says it would highly recommend cogeneration to other regional businesses. "Something like this is great because technically the water is a waste stream for us, and the biogas is another waste stream. If you have the ability to use that kind of free fuel source, it really would make no sense not to take advantage of it."

-- Hillary Mizia, New Belgium Brewery

For More Information

New Belgium Brewing Company
Hillary Mizia, 970-221-0524
www.newbelgium.com
More CHP Project Profiles:
www.intermountainCHP.org/casestudies
Date produced: December 2004